06-07-06

IFW

OIPE IAP66
JUN 06 2006
PATENT & TRADEMARK OFFICE

JAMES D. WELCH
ATTORNEY AT LAW
PROFESSIONAL ENGINEER

INTELLECTUAL PROPERTY
402-391-4448

10328 PINEHURST AVE.
OMAHA, NEBRASKA 68124

June 5, 2006

Commissioner for Patents
Box: 1450
Alexandria, VA 22313-1450

RE: APPLICATION OF TIWALD TITLED "METHOD OF APPLYING PARAMETRIC OSCILLATORS TO MODEL DIELECTRIC FUNCTIONS";
SERIAL NO. 10/849,729;
FILE DATE: 05/20/2004;
ART UNIT: 2857;
EXAMINER: CHARIOUI, M.

PROVISION OF REPLACEMENT PAGES 30, 31 & 32.

Dear Sir;

Examiner Charioui phoned and requested replacement pages 30, 31 and 32 for the identified Allowed Application. Please find enclosed better copy.

Sincerely,

JAMES D. WELCH
JW/hs

CERTIFICATE OF MAILING

I HEREBY CERTIFY THAT THIS TRANSMITTAL IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE WITH SUFFICIENT POSTAGE FOR EXPRESS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO THE COMMISSIONER FOR PATENTS, BOX: 1450, ALEXANDRIA VA 22313-1450 ON THE DATE INDICATED BELOW.

6/06/06

JAMES D. WELCH DATE

intersection with the horizontal axis, as demonstrated in Figs. 2 and 3. Note, variations on the Lorentz and Gaussian Oscillators include Ionic1, Ionic2, Harmonic, TOLO Structures as indicated in Figs. 4h, 4i, 4j and 4k respectively. Said additional Oscillator Structures are described in the J.A Woollam Co. WVASE Manual, which is incorporated by reference herein. Equations presented in the J.A. Woollam CO. WVASE Manual are included directly to provide insight to the Form of the Mathematical Equations which define them:

Gaussian:

$\varepsilon_{n\_Gaussian} = \varepsilon_{n1} + i\varepsilon_{n2}$, where

$$\varepsilon_{n1} = \frac{2}{\pi} P \int_0^{\infty} \frac{\xi \varepsilon_{n2}(\xi)}{\xi^2 - E^2} d\xi,$$

using ε_{n2} as defined below.

Style	Equation	Fit Parameters (n = osc#)
Gau.0 (eV) Gau.5 (cm^{-1})	$\varepsilon_{n2} = A_n e^{-\left(\frac{E-E_n}{Br_n}\right)^2} - A_n e^{-\left(\frac{E+E_n}{Br_n}\right)^2}$	*Ampn* = A_n *(dimensionless)*, *Enn* = E_n *(eV)*, *Brn* = Br_n *(eV)* *Ampn* = A_n *(dimensionless)*, *En1* = E_n *(cm^{-1})*, *Br1* = Br_n *(cm^{-1})*
Gau.1 (eV) Gau.6 (cm^{-1})	$\varepsilon_{n2} = \frac{A_n}{Br_n} e^{-\left(\frac{E-E_n}{Br_n}\right)^2} - \frac{A_n}{Br_n} e^{-\left(\frac{E+E_n}{Br_n}\right)^2}$	*Ampn* = A_n *(eV)*, *Enn* = E_n *(eV)*, *Brn* = Br_n *(eV)* *Ampn* = A_n *(cm^{-1})*, *Enn* = E_n *(cm^{-1})*, *Brn* = Br_n *(cm^{-1})*
Gau.2 (eV) Gau.7 (cm^{-1})	$\varepsilon_{n2} = \frac{A_n E_n}{Br_n} e^{-\left(\frac{E-E_n}{Br_n}\right)^2} - \frac{A_n E_n}{Br_n} e^{-\left(\frac{E+E_n}{Br_n}\right)^2}$	*Ampn* = A_n *(dimensionless)*, *Enn* = E_n *(eV)*, *Brn* = Br_n *(eV)* *Ampn* = A_n *(dimensionless)*, *Enn* = E_n *(cm^{-1})*, *Brn* = Br_n *(cm^{-1})*

Lorentz:

Style	Equation	Fit Parameters (n = osc#)
Lor.0 (eV) Lor.5 (cm^{-1})	$\varepsilon_{n\_Lorentz} = \dfrac{A_n Br_n E_n}{E_n^2 - E^2 - iBr_n E}$	$Ampn = A_n$ (dimensionless), $Enn = E_n$ (eV), $Brn = Br_n$ (eV) $Ampn = A_n$ (dimensionless), $En1 = E_n$ (cm^{-1}), $Br1 = Br_n$ (cm^{-1})
Lor.1 (eV) Lor.6 (cm^{-1})	$\varepsilon_{n\_Lorentz} = \dfrac{A_n E_n}{E_n^2 - E^2 - iBr_n E}$	$Ampn = A_n$ (eV), $Enn = E_n$ (eV), $Brn = Br_n$ (eV) $Ampn = A_n$ (cm^{-1}), $Enn = E_n$ (cm^{-1}), $Brn = Br_n$ (cm^{-1})
Lor.2 (eV) Lor.7 (cm^{-1})	$\varepsilon_{n\_Lorentz} = \dfrac{A_n E_n^2}{E_n^2 - E^2 - iBr_n E}$	$Ampn = A_n$ (dimensionless), $Enn = E_n$ (eV), $Brn = Br_n$ (eV) $Ampn = A_n$ (dimensionless), $Enn = E_n$ (cm^{-1}), $Brn = Br_n$ (cm^{-1})

Harmonic:

Style	Equation	Fit Parameters (n = osc#)
Lor.0 (eV) Lor.5 (cm^{-1})	$\varepsilon_{n\_Harmonic} = \dfrac{A_n Br_n E_n}{E_n^2 - E^2 + 1/4\, Br_n^2 - iBr_n E}$	$Ampn = A_n$ (dimensionless), $Enn = E_n$ (eV), $Brn = Br_n$ (eV) $Ampn = A_n$ (dimensionless), $En1 = E_n$ (cm^{-1}), $Br1 = Br_n$ (cm^{-1})
Lor.1 (eV) Lor.6 (cm^{-1})	$\varepsilon_{n\_Harmonic} = \dfrac{A_n E_n}{E_n^2 - E^2 + 1/4\, Br_n^2 - iBr_n E}$	$Ampn = A_n$ (eV), $Enn = E_n$ (eV), $Brn = Br_n$ (eV) $Ampn = A_n$ (cm^{-1}), $Enn = E_n$ (cm^{-1}), $Brn = Br_n$ (cm^{-1})
Lor.2 (eV) Lor.7 (cm^{-1})	$\varepsilon_{n\_Harmonic} = \dfrac{A_n E_n^2}{E_n^2 - E^2 + 1/4\, Br_n^2 - iBr_n E}$	$Ampn = A_n$ (dimensionless), $Enn = E_n$ (eV), $Brn = Br_n$ (eV) $Ampn = A_n$ (dimensionless), $Enn = E_n$ (cm^{-1}), $Brn = Br_n$ (cm^{-1})

Ionic1 & Ionic2:

Style	Equation	Fit Parameters (n = osc#)
Ion1.0 (eV) Ion1.5 (cm^{-1})	$\varepsilon_{Ion1\_n} = \varepsilon_{\infty n} + \frac{E_{Tn}^{2}(\varepsilon_{dcn} - \varepsilon_{\infty n})}{E_{Tn}^{2} - E^2 - iBr_n E}$	*edcn* = ε_{dcn} *(dimensionless),* *einfn* = $\varepsilon_{\infty n}$ *(dimensionless),* *Eton* = E_{Tn} *(eV), Br$_n$ = Brn(eV)* *edcn* = ε_{dcn} *(dimensionless),* *einfn* = $\varepsilon_{\infty n}$ *(dimensionless),* *Eton* = E_{Tn} *(cm^{-1}), B$_{rn}$ = B$_{rn}$ (cm^{-1})*
Ion2.0 (eV) Ion2.5 (cm^{-1})	$\varepsilon_{Ion2\_n} = \varepsilon_{dcn}\left(\frac{E_{Tn}^{2}}{E_{Ln}^{2}} + \frac{E_{Tn}^{2}\left(1 - \frac{E_{Tn}^{2}}{E_{Ln}^{2}}\right)}{E_{Tn}^{2} - E^2 - iBr_n E}\right)$	*edcn* = ε_{dcn} *(dimensionless),* *Eton* = E_{Tn} *(eV), Brn = B$_{rn}$ (eV)* *Elon* = E_{Ln} *(eV)* *edcn* = ε_{dcn} *(dimensionless),* *Eton* = E_{Tn} *(cm^{-1}), Brn = B$_{rn}$ (cm^{-1})* *Elon* = E_{Ln} *(cm^{-1})*

TOLO:

Style	Equation	Fit Parameters (n = osc#)
TOLO.0 (eV) TOLO.5 (cm^{-1})	$\varepsilon_{n\_TOLO} = A_n \frac{E_{lon}^{2} - E^2 - iB_{lon}E}{E_{ton}^{2} - E^2 - iB_{ton}E}$	*Ampn* = A_n *(dimensionless),* *Elon* = E_{lon} *(eV),* E_{ton} = *Eton (eV)* *Blon* = B_{lon} *(eV), Bton* = B_{ton} *(eV)* *Ampn* = A_n *(dimensionless),* *Elon* = E_{lon} *(cm^{-1}), Eton* = E_{ton} *(cm^{-1})* *Blon* = B_{lon} *(cm^{-1}), Bton* = B_{ton} *(cm^{-1})*
TOLO.1 (eV) TOLO.6 (cm^{-1})	$\varepsilon_{n\_TOLO} = \frac{A_n}{B_{ton}} \frac{E_{lon}^{2} - E^2 - iB_{lon}E}{E_{ton}^{2} - E^2 - iB_{ton}E}$	*Ampn* = A_n *(eV),* *Elon* = E_{lon} *(eV),* E_{ton} = *Eton (eV)* *Blon* = B_{lon} *(eV), Bton* = B_{ton} *(eV)* *Ampn* = A_n *(cm^{-1}),* *Elon* = E_{lon} *(cm^{-1}), Eton* = E_{ton} *(cm^{-1})* *Blon* = B_{lon} *(cm^{-1}), Bton* = B_{ton} *(cm^{-1})*
TOLO.2 (eV) TOLO.7 (cm^{-1})	$\varepsilon_{n\_TOLO} = A_n \frac{E_{ton}}{B_{ton}} \frac{E_{lon}^{2} - E^2 - iB_{lon}E}{E_{ton}^{2} - E^2 - iB_{ton}E}$	*Ampn* = A_n *(dimensionless),* *Elon* = E_{lon} *(eV),* E_{ton} = *Eton (eV)* *Blon* = B_{lon} *(eV), Bton* = B_{ton} *(eV)* *Ampn* = A_n *(dimensionless),* *Elon* = E_{lon} *(cm^{-1}), Eton* = E_{ton} *(cm^{-1})* *Blon* = B_{lon} *(cm^{-1}), Bton* = B_{ton} *(cm^{-1})*